Draft Groundwater Update

Brookhaven National Laboratory Community Advisory Council Meeting December 14, 2017

Bill Dorsch

Manager, Groundwater Protection Group







Agenda

- Completion of Western South Boundary (WSB) Off-Site VOC Characterization
- WSB Groundwater Modeling Simulation Results
- Path forward for WSB
- Response to Suffolk County Dept. of Health Services (SCDHS) request for additional 1,4-Dioxane characterization and characterization of low level Perfluorinated Compounds (PFCs) detected in BNL Supply Wells
- Update on Ethylene Dibromide (EDB) detections in North Street East Monitoring Well





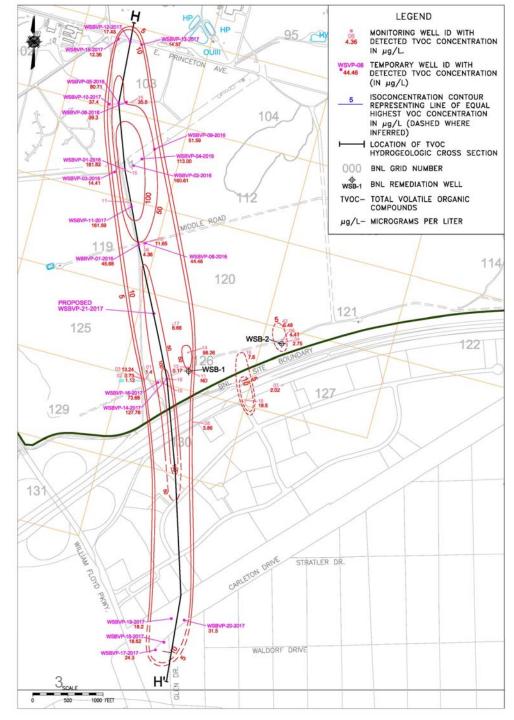


Western South Boundary Deep VOCs: Plume Characterization

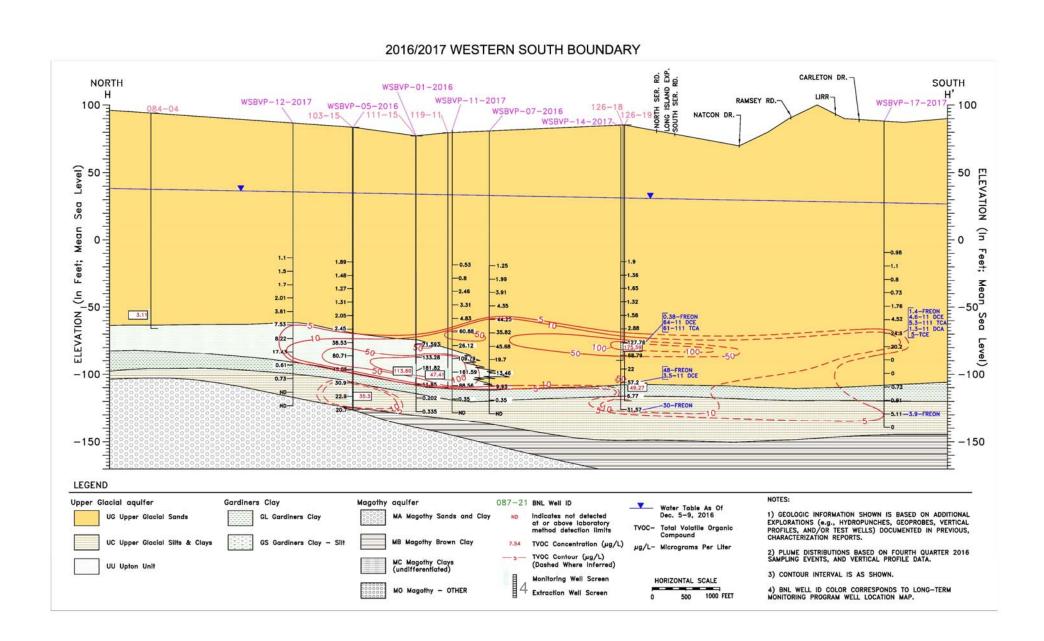
- Since September CAC update, installed four temporary vertical profile wells on Carleton Dr.
- Highest VOC concentrations in VP-20 (145-160 ft. below land surface)
 - Freon-12 13 μg/L
 - 1,1,1-Trichloroethane (TCA) 4 μg/L
 - Trichloroethene (TCE) 6 μg/L
 - 1,1-Dichloroethene (DCE) 5 μg/L
 - Drinking Water Standard is 5 μg/L
- VOCs are present in two distinct zones within the deep Upper Glacial Aquifer:
 - DCE/TCA are the primary contaminants in the shallower zone (~150 ft. below land surface).
 - Freon-12 is the primary contaminant in the deeper zone (~210 ft. below land surface).
- The groundwater flow rate in the shallower zone is ~440 feet/yr. and in the deeper zone is ~90 feet/yr.





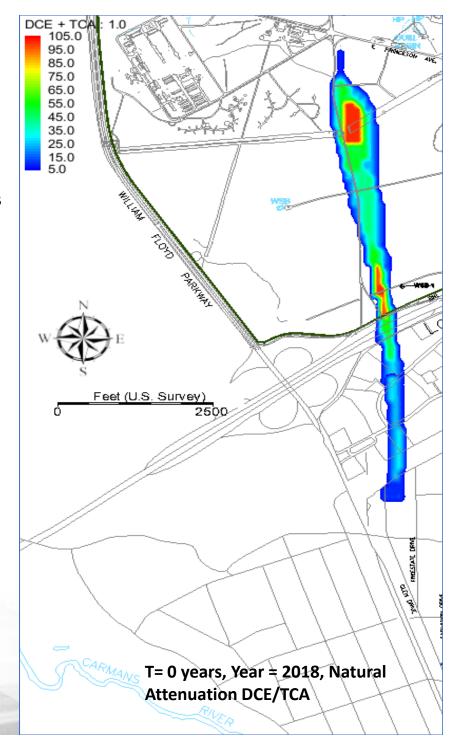


Western South Boundary Deep VOCs: Plume Characterization



Western South Boundary DCE/TCA: Natural Attenuation Modeling

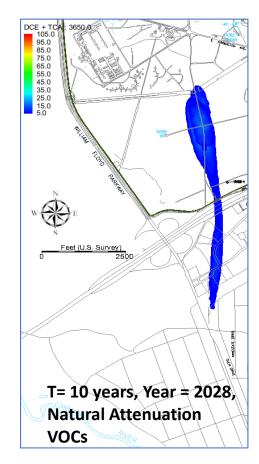
- Natural attenuation fate and transport simulations were run separately for DCE/TCA and Freon.
- The OU III ROD cleanup goal is to meet drinking water standards in the Upper Glacial aquifer by 2030. This contamination is in the deep Upper Glacial Aquifer.
- Based on the results of the natural attenuation simulations, both depth zones of contamination fail to meet the cleanup goal.
- Under natural attenuation, the DCE/TCA remains above drinking water standards for more than 30 years (~2049).
- Under natural attenuation there is no impact to the Carman's River and the plume advances to approximately Moriches Middle Island Road.

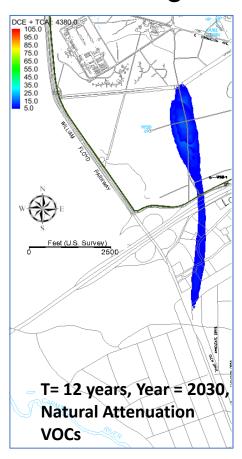


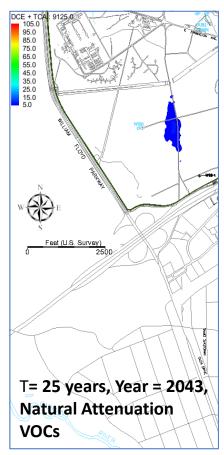


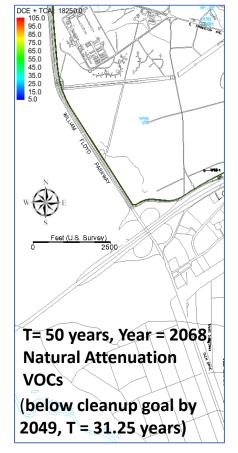


Western South Boundary DCE/TCA: Natural Attenuation Modeling









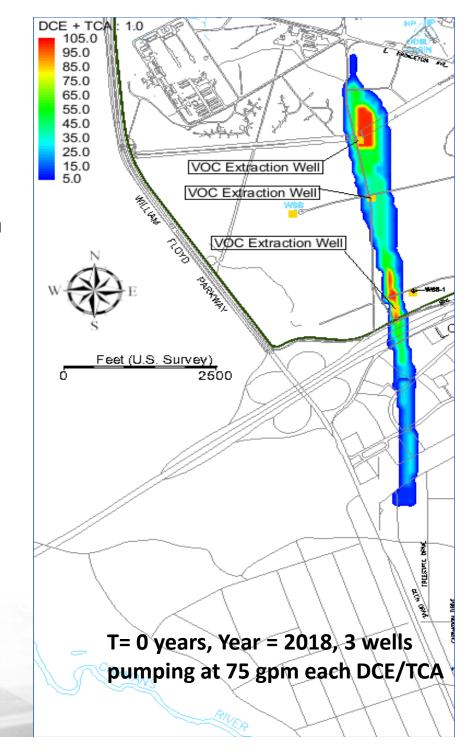






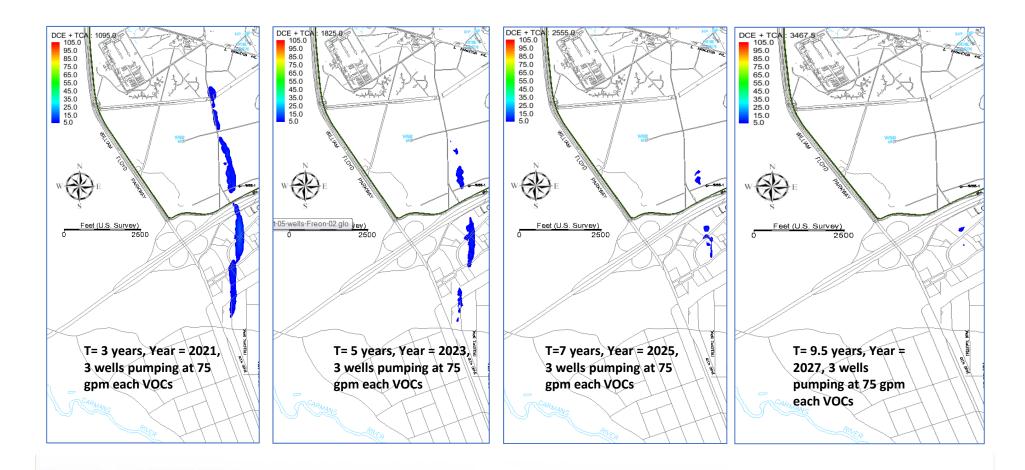
Western South Boundary DCE/TCA: Pump and Treat Modeling

- Optimal pumping scenario to meet cleanup goal requires three new extraction wells.
- This scenario meets the cleanup goal by 2027.





Western South Boundary DCE/TCA: Pump and Treat Modeling



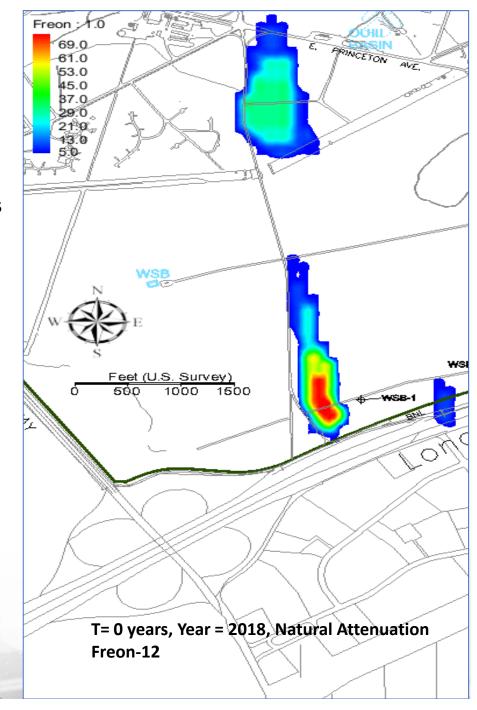






Western South Boundary Deep Freon-12: Natural Attenuation Modeling

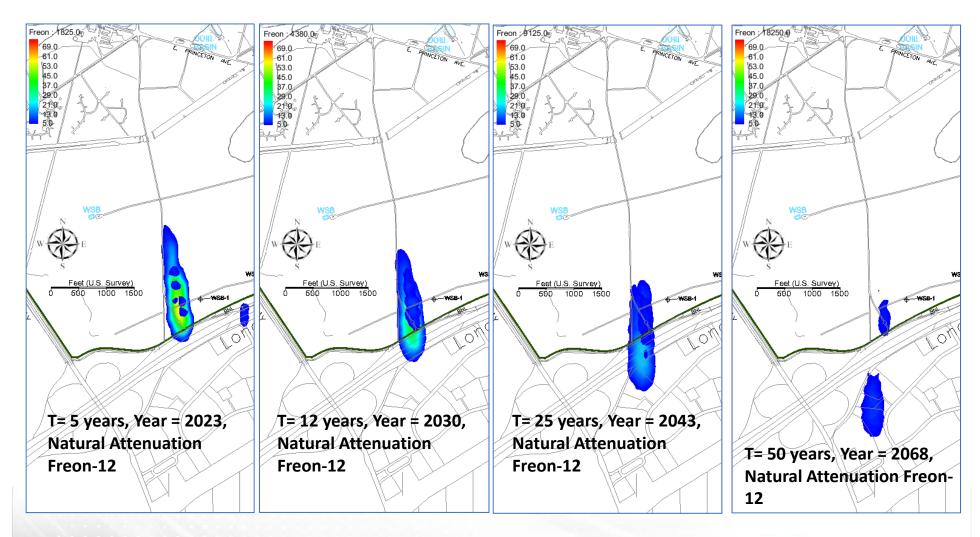
- Under natural attenuation, the Freon-12 remains above drinking water standards for more than 50 years (~2068)
- Under natural attenuation, there is no impact to the Carman's River.







Western South Boundary Deep Freon-12: Natural Attenuation Modeling



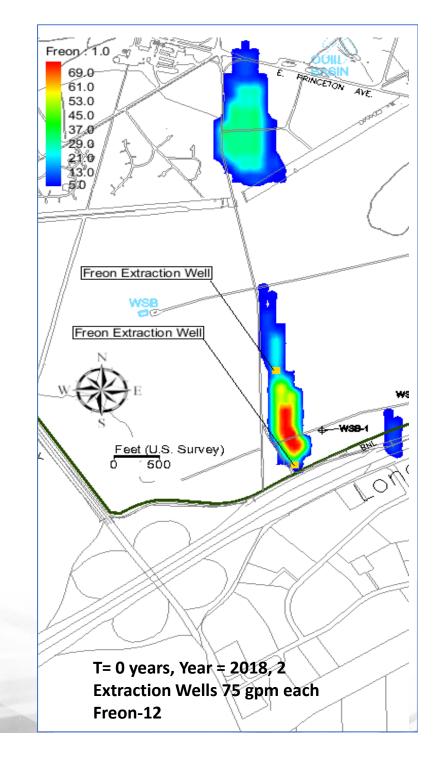






Western South Boundary Freon-12: Pump and Treat Modeling

- Optimal pumping scenario to meet cleanup goal requires two new extraction wells.
- This scenario meets the cleanup goal by 2030.

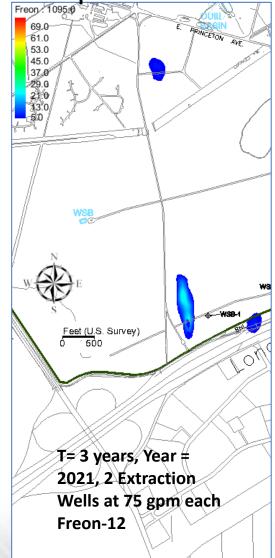


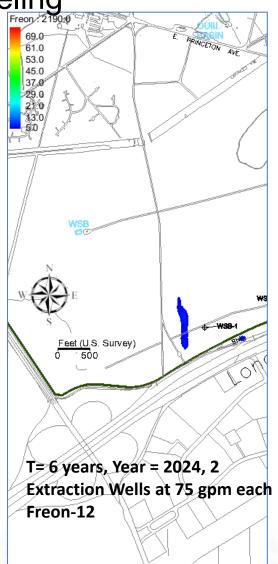


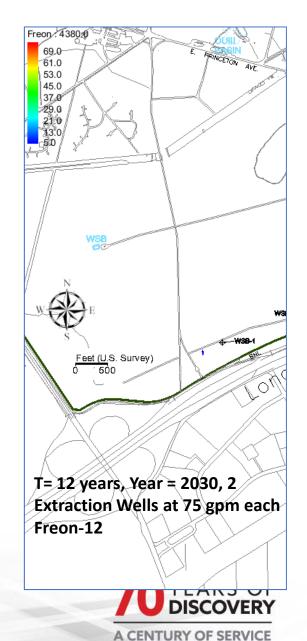


Western South Boundary Freon-12:

Pump and Treat Modeling









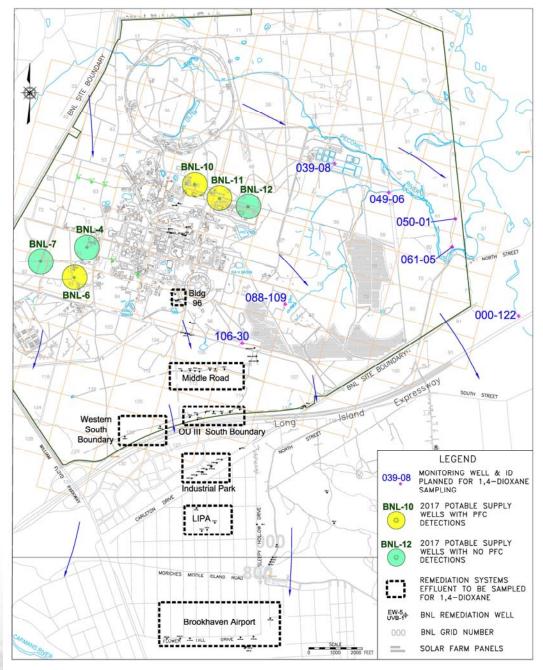


Emerging Contaminants – Perfluorinated Compounds (PFCs)

- Testing by SCDHS in 2017 detected PFCs in three of BNL's potable supply wells
 - Maximum PFOS/PFOA = 24 ng/L
 - EPA Health Advisory = 70 ng/L
 - Routine testing will be added to potable water monitoring program in 2018
- SCDHS requested an investigation on source of PFCs
 - Source is unknown
 - In 2018, temporary wells will be installed to determine distribution of PFCs in supply well source areas
- Current sampling protocol needs to be revised to prevent possible cross contamination of samples
 - Cannot use:
 - PFC (Teflon) containing sampling pumps, tubing, or containers
 - Water proof clothing or work boots
 - Water proof field notebooks
 - Certain personal care products



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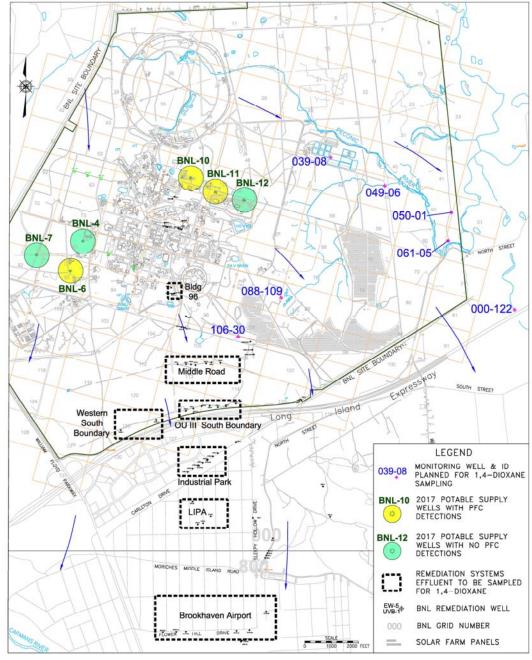


Emerging Contaminants – 1,4-Dioxane

- 1,4-Dioxane has been used as a stabilizer for TCA
- January 2017 BNL sampled 22 representative monitoring wells for 1,4-Dioxane in response to NYSDEC/NYSDOH request
 - Briefed CAC in March 2017
 - Detected in 17 of 22 wells
 - Below current NYS standard of 50 µg/L
- Fall 2017 SCDHS requested additional sampling for 1,4-Dioxane
 - BNL responded with the planned sampling approach
 - In early December, BNL collected samples from 7 additional monitoring wells, the Sewage Treatment Plant effluent, and the effluent from five operating VOC treatment systems
 - Data will be available in late January



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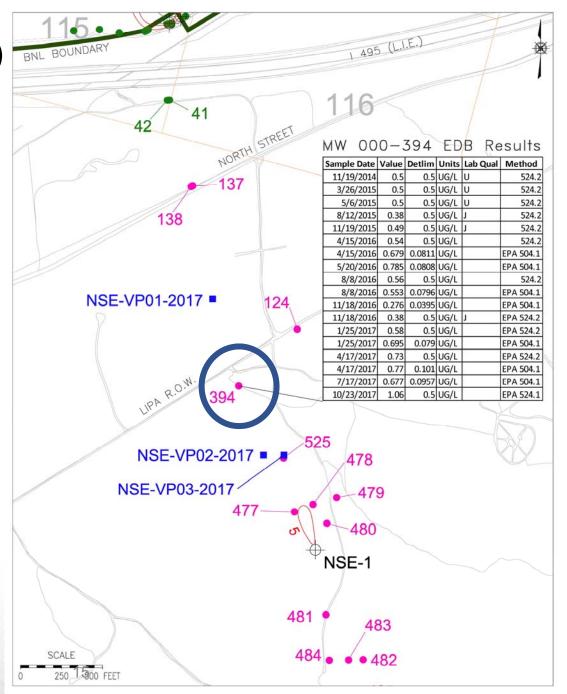


North Street East – Ethylene Dibromide (EDB) Update

- Following September CAC update, EDB concentration in well 000-394 increased to 1.06 μg/L. The drinking water standard is 0.05 μg/L.
- There have been no detections of EDB in NSE-1 or the area monitoring wells
- Recommendation in 2016
 Groundwater Status Report was to perform additional characterization if concentrations did not show consistent decrease in 2017
- Planning to install three temporary vertical profile wells to better characterize extent of EDB in this area



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Questions?





YEARS OF DISCOVERY

Backup Slides







Western South Boundary Model Layering Structure and Hydraulic Conductivities

